



## Navy EOD Blows up Wildlife Biology with Big Data

*What do you get when you mix a maniacal hunter, a bomb squad expert and a computer geek? Josh Nowak.*

“My dad was late for my baptism because he was in a tree stand,” says Josh Nowak. He comes from a long line of hard-bitten hunters and grew up hunting and fishing with his grandfather and father in the hardwoods of Michigan’s Lower Peninsula.

“I just went over the deep end when I was a kid. When I turned 12, I had a bow in my hand, and I was hunting 20 to 30 days a year already,” he says. “That’s kind of how this whole thing started.”

This whole thing is a wild blend of old-school biology and the cutting edge of “big data.” Nowak is now a research scientist

at the University of Montana who specializes in quantitative wildlife biology and helped to pioneer PopR, a statistical software that helps state agencies turn big game counts into population estimates and then management strategies via mathematical modeling. (To learn more about how PopR is reshaping the ways in which states manage wildlife and provide better hunting opportunities, see “Big Game Meets Big Data,” page 58.)

But the kid who grew up chasing North Woods whitetails never dreamed of becoming a statistician.

“I started this all wanting to sit on a mountainside and watch

critters and be outside,” he says. “Next thing I know, I’m a computer geek with three monitors.”

When Nowak finished high school, he still had a little growing up to do. So he joined the Navy, where he spent five years as an Explosive Ordnance Disposal technician.

“Of course, going in the Navy, you’re all enamored by Navy SEALs, but I saw some videos of EOD. The problems looked more interesting to me. The SEAL problem is *don’t die and shoot the other guy*. That’s a hard problem. But put it in the same context, now there is a device behind the door,” Nowak says.

"I'm the guy dealing with that while all the other stuff is going on. That seemed like a bigger challenge that took a little more thought. Or at least that's how I perceived it. Plus you still get to do all the same fun stuff, like rappel out of helicopters and dive."

What the Navy website calls "so much more than the world's ultimate bomb squad," EOD techs are trained to disarm explosive devices, neutralize chemical threats and defuse nuclear weapons—and to do it all 30 meters underwater or after parachuting into a combat situation. The EOD school is considered one of the most rigorous and challenging training programs in the world, with dive training, parachute training and tactical training in addition to the main course.

"When I got out of high school, I needed to mature a little bit. And the Navy was a productive but fun avenue to do that. About six months in, some switch flipped in me," Nowak says. "I wanted to go to school and find myself and all kinds of things. I went through a lot of schooling that was super intense."

Nowak says that training instilled qualities in him that he carries over to his current work—including extreme attention to detail, the ability to synthesize new and complex information, and discipline.

"Tongue in cheek, but cut the red wire and you better know...When you're diving and you're doing something else, like working on a torpedo, there is a lot going on. It requires attention to detail, but you also might be in a new environment. Maybe it's stuck backwards in the coral reef. Now you have to decide how to deal with that because it changes what you have access to. I really enjoyed that part of the problem-solving," he says. "It exposed me to a lot. It was a great

life experience."

After five years in the Navy, he was hungry for the next challenge and set his eyes on the University of Montana's wildlife biology program.

"While I was here, I met a bunch of people and volunteered a lot, got a bunch of field gigs. I really loved it," he says.

Those connections opened up the opportunity for graduate school at Université Laval in Quebec City, Canada, where ironically he spent time working on a project about elk in Idaho.

"While I was there, I started to get frustrated with the statistical tools and software. I had questions that weren't answerable with the canned software packages that were available at the time. I wanted to know about elk movement, and there was very little that was already packaged for you to figure that stuff out. That led me to become more and more quantitative, and to think more and more about programming."

Nowak set out to do it himself—learning coding and Bayesian statistics and applying them to wildlife management largely through an education of his own creation. He taught himself through trial and error, took short courses where he could from Montreal to Scotland, and created his own special subject classes working through different books when standardized classes weren't available.

And then, in true stochastic fashion, life led him back to the University of Montana as a postdoc in the Quantitative Wildlife Ecology Lab working under Paul Lukacs. The lab develops and applies quantitative methods to ecological problems, primarily in wildlife population dynamics.

Nowak was set to speak at a wildlife conference in Boise when a colleague called him to

say Lukacs was speaking the night before and Nowak should stop by.

"I listened to his talk, and it was so similar to a lot of things that I was working on," Nowak says. "When he was done, there was a lag. No one was really asking questions. So I started asking questions."

Afterward, they got dinner.

"We're still going on about all these techniques and stuff, and he excused himself for a moment," Nowak says. "My wife leaned over and punched me and said, 'This is an interview.' I was like, 'No way!' And next thing I know, I'm a postdoc at the University of Montana."

Since then, Nowak and Lukacs have worked on everything from sage grouse to mountain lions, and now the two are also partners in a small biological consulting company.

In his free time, Nowak plays goalie in the local hockey league and coaches youth goalies. He and his wife of 11 years also enjoy rafting and fishing, though Nowak says fly fishing is still a new challenge for him, very different from fishing for walleye and pike where he grew up. They live on a small ranch in the hills above Missoula, where they help with calving season, branding and wrangling the horses.

Come fall, he still bowhunts whitetails with the same old fervor and is now equally passionate about chasing elk.

As far as Nowak is concerned, statistics fits right into the mix.

"I like my life to be hard, apparently. I archery hunt, I play goalie in hockey, I code and I care about statistics," Nowak says. "These techniques where you can bring in multiple sources of data, where we might think about sharing information across space with units that are similar, those challenges are interesting. I really like that challenge. And it's always changing."